

ORIGINAL ARTICLES

STUDIES IN APPENDICITIS*

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ALTHOUGH several excellent papers on acute appendicitis treated in various Eastern clinics have appeared in recent surgical journals, few such studies have been made on the West Coast. It appeared desirable, therefore, to make such an analysis, using the facilities of St. Luke's Hospital in San Francisco. St. Luke's Hospital contains two hundred beds and has a daily average of 153.3 patients. There are ten surgeons (General Surgery and Gynecology) on the staff, and there is, besides, a large group of visiting surgeons, not staff members.

The records of these patients admitted to the hospital are classified in accordance with the "Standard Classified Nomenclature of Disease," edited by H. B. Logie, M. D. Referring to the files 2043 records were reviewed of patients admitted between July 1, 1933 and June 30, 1939. In this group 954 patients were found to have been subjected to appendectomies incidental to other surgical procedures, and these are not considered further. Eighty-nine patients were admitted with a diagnosis of appendicitis, but not subjected to operation.

There remains, therefore, a group of 1000 patients, which, for the purpose of this study, can be divided:

- I: Acute Suppurative, 343 cases.
- II: Acute Perforative, 84 cases.
- III: Subacute Cases, 215.
- IV: Chronic Cases, 353.
- V: Abscess Cases, 5.

SOURCE MATERIAL FOR THIS STUDY

ACUTE APPENDICITIS

(Acute suppurative 343, and perforated 84; total, 427 cases.)

Sex: Male 265. Female 162.

Age: Age incidence is indicated on Figure 1, the majority of patients being between the ages of 16 and 30.

Incidence: Figure 2 expresses graphically the incidence of acute appendicitis during the various

months of the year. It is evident that there is practically no evidence of seasonal variation of the disease. A peak of the graph occurs in January (Midwinter), and this is equalled by a peak in August (Midsummer).

Symptoms:

An analysis of the initial symptoms encountered follows:

1. *Pain.* The typical classical symptoms of pain, noticed first in the epigastrium, moving later to the right lower quadrant, occurred in 207 patients (48.5%). Pain commenced and remained in the right lower quadrant in 110 patients (24%); commenced and remained about the umbilicus in 23 patients (4.9%); commenced at the umbilicus and then moved to the right lower quadrant in 21 patients (4.8%); commenced as generalized cramps, and persisted as such until operation, 23 patients (4.9%). In 30 records the information given was insufficient to allow accurate analysis. In the acute group this symptom is presented in Table I.

2. *Nausea and vomiting* are without doubt the most characteristic symptoms of acute appendicitis, following on pain; 235 patients complained of nausea and vomiting; 72 of nausea without vomiting, and 76 (17.8%) stated that there had been no nausea or vomiting. In 44 records no mention is made of nausea or vomiting.

Physical examination of the acute suppurative group, (not including the "perforated" group), is analyzed in Table 2. 339 patients.

Tenderness. Tenderness and acute tenderness in the right lower quadrant were encountered in 200 patients. Moderate or mild tenderness in the right lower quadrant in 58 patients; general tenderness over the entire abdomen in 14; epigastric tenderness in 7; bilateral, lower abdominal tenderness in 14; and right upper quadrant tenderness in 2 patients.

Guarding. This physical sign is probably impossible to analyze in a statistical survey, since such individual difference of opinion exists as to what constitutes guarding, and whether or not a given reaction of the abdominal muscle should be termed "splinting," "guarding," or "rigidity." Nevertheless, the terms as encountered in the patient's records appear as follows:

Guarding and rigidity in right lower quadrant, 156.

Moderate or no rigidity, 117.

Rebound tenderness is another physical sign, the evaluation of which often shows considerable personal variation. As a rule the intern is most apt to make the statement, "rebound tenderness." In our own personal cases we would consider the intern's interpretation of this physical sign correct in about 25 per cent of the cases. In this group of 339 patients rebound tenderness is reported in 155 cases, and in 29 patients' records it is stated that there was no rebound tenderness. Skin hyperaesthesia is mentioned in 12 records as being present, psoas spasm in 16. Cross reference (pain on right lower abdomen when pressure is applied

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to the left lower abdomen) was noted in 16 records. A "board-like" abdomen—generalized—was encountered in 2.

Previous attacks of appendicitis were noted in 117 records, and in 50 records it stated definitely that no previous attacks were experienced. In 260 records the question of previous attacks escaped mention.

In eighty-eight records *cathartics administered* previous to operation were mentioned. Unquestionably a number of records are incomplete in this regard. In this group of eighty-eight, however, we find: castor oil, 9; cathartics, 31; exlax, 15; mineral oil, 13; epsom salts, 7; milk of magnesia, 13.

Duration of symptoms previous to operation is indicated in hours in *Figure 3*. In studying this chart one is struck with the peaks at 12, 24, 36 and 48 hours. This is due to the fact that in many records the onset of symptoms is not given at any specified hour. Charts frequently indicate that symptoms have been present one day, or that symptoms started "last night." The statistician can, therefore, only record these periods to the nearest 12-hour period previous to operation. On this *Figure* also appear the number of patients with perforation, as well as the duration of symptoms. It will be noted that one patient suffered perforation after 14 hours of symptoms, and two after twenty-four hours of symptoms. Elderly patients, as is well known, frequently have most atypical symptoms, and perforation in this age group is often the first symptom of the disease. In general, however, the *Figure* indicates increasing frequency of perforation as the duration of symptoms increases.

TABLE 1.—Location of Abdominal Pain

Localization of abdominal pain—before operation	427 cases
Epigastric, then generalized, then to right lower quadrant	207
Commenced and remained right lower quadrant	110
Commenced and remained about umbilicus	23
Generalized cramps persisting until operation	23
Commenced at umbilicus, then to right lower quadrant	21
Continued at umbilicus until operation	11
Commenced and remained left lower quadrant	1
Commenced and remained right upper quadrant	1
Insufficient record	30

TABLE 2.—Physical Examination, Tenderness

Tenderness in abdomen, preoperative	295 cases
Tenderness or "acute tenderness" right lower quadrant	200
Moderate or slight tenderness right lower quadrant	58
General tenderness entire abdomen	14
Epigastric tenderness only	7
Bilateral lower abdominal tenderness	14
Right upper quadrant tenderness	2

The time of onset of symptoms is definitely stated in 318 cases, and is indicated in *Figure 4*. Except for a slight peak at 8 A.M. and a valley at 1 P.M. this graph is remarkably level throughout.

The leucocyte count, unquestionably the most important laboratory finding in acute appendicitis, is indicated in *Figure 5* (343 cases). The peaks are found at 15,000 and 16,000, with another fairly sharp rise at 20,000.

The differential count indicating only the polymorphonuclear percentage appears on *Figure 6*, which indicates a peak at 80 per cent, with the mean at 87 per cent. Single low counts of 46 per cent, 53 per cent, 54 per cent, 56 per cent are found among children.

Temperature. A rise in temperature is not a characteristic finding in early appendicitis. The onset of pain, with nausea and vomiting in the early stages of the disease, is not associated with fever. However, when checking the admission temperature of 353 patients in the acute suppurative group, and charting these (*Figure 7*) one finds they reach a mean at 37.5, falling very rapidly, although a few are found at the higher temperatures. One should interpret a chart, such as *Figure 7*, with the data presented in *Figure 3*, and it will be apparent that even with prolonged symptoms duration there is not progressively a continued rise in temperature. A marked rise in temperature, during an attack of acute appendicitis, does not necessarily indicate an advanced degree of inflammation, although this point is difficult to establish in a statistical survey such as the present.

In *Table 3*, the nonperforated are segregated from the perforated group. If the patients in each group are arranged on the basis of 1/2 degree centigrade of fever, it will be noted that 31.4 per cent of 338 nonperforated patients had a temperature between 37.0 and 37.4, whereas 25 per cent of the perforated group of 89 patients had a temperature between 38.0 degrees and 38.4 degrees.

TABLE 3.—Temperature Course

(A) Acute Group				(B) Perforated Group			
Centigrade	Centigrade	Number	Percentage	Number	Percentage	Percentage	Percentage
36.5	36.9	42	12.4%	8	8.7%		
37.0	37.4	107	31.4%	17	18.8%		
37.5	37.9	88	26.0%	14	10.5%		
38.0	38.4	48	14.5%	23	25.8%		
38.5	38.9	24	7.8%	17	18.8%		
39.0	39.4	8	2.6%	8	8.7%		
Others		21		2			
		338		89			

Anaesthesia. Gas, ether and spinal anaesthesia constituted the most popular anaesthetic agents as indicated in the following chart:

Gas and ether	238
Spinal	117
Cyclopropane and ether	35
Nitrous oxide, oxygen	14
Cyclopropane	8
Nitrous oxide, novocaine	5
Nitrous oxide, ether, novocaine	4
Cyclopropane, novocaine	2
Avertin and ether	2
Novocaine	1

Types of Incision. The following table indicates the types of incision selected for the appendectomies:

Incision	Males (Number)	Females (Number)
Male: Right rectus.....	120	Female: 56
Para rectus	65	38
McBurney*	52	27
Midline	8	33
No record.....	18	10

Note: The various modifications of the McBurney or gridiron incisions are included under this heading.

Purse string. In the group of acute suppurative appendices, the records indicate that a purse string was used in 91 operations, was not used in 169, and is not recorded in 83. In the group of perforated appendices the purse string suture was used in 18 patients, not used in 32 and not mentioned in 34.

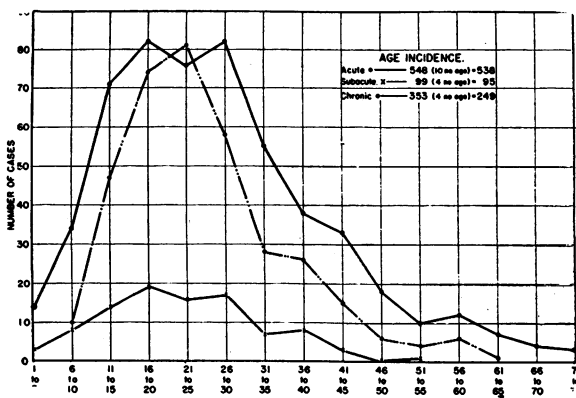


Fig. 1.—Age incidence of 548 acute, 353 chronic and 99 subacute cases.

Drainage. In the acute suppurative group 83 patients were operated with drainage of the abdomen in one form or another. Some 264 patients were "not drained," and no record was found in 26. In the perforated group drainage was instituted in 65, no drainage in 18 and no record in 1.

Findings at operation. In this group of non-perforated appendices the presence of a fecolith is mentioned in 15. The appendix was reported gangrenous in 53, necrotic in 8, fibrin covered in 80. The contiguous cecum was noted to be inflamed in 7 patients. However, these figures unquestionably carry a high degree of inaccuracy since many of the surgeons failed to qualify the appearance of the appendix further than to state "appendix acutely inflamed," and in a number of records the pathological findings were limited to the statement, "acute suppurative appendicitis."

The position of the appendix, as noted at operation, was frequently not recorded. Whenever the appendix was found to be in a retrocecal position this fact was noted, since 62 appendices were recorded as retrocecal, 18 were reported as lateral to the cecum and 15 were noted as pelvic. In the remainder of the records no note is made of the

position of the appendix. In 14 patients the notation appeared that the appendix was omentum covered, and in 4 patients an abscess was encountered, although the appendix had not perforated.

Complications (non-fatal). Acute suppurative group, 334 cases.

Pulmonary:	Bronchopneumonia.....	8
	Upper respiratory, not diagnosed pneumonia	7
	Pleurisy	5
	Pulmonary infarct (recovery).....	1
	Sore throat	4
	Atelectasis	1

Abdominal:	Wound infections (undrained incisions)	30
	Ileus	7
	Acute gastric dilatation.....	2
	Abscess, pelvic	3
	abdominal	2
	General peritonitis (not present at operation)	1
	Fecal fistula	2
	Wound rupture	3

General:	Phlebitis	2
	Cystitis (severe)	1
	Nephritis	1

Mortality: In this group of 343 patients suffering from acute suppurative appendicitis, four deaths occurred—a total mortality of 1.16 per cent. These four patients may be briefly summarized:

1. Gangrenous appendix, died, 12th day. Broncho pneumonia and peritonitis.
2. Gangrenous appendix, pelvic position, much peritonitis, died, general peritonitis and ileus, on 8th day.
3. Acute pelvic appendix, peritonitis, colon odor, died, 3rd day, with pulmonary embolism proven at autopsy. Peritonitis confined to pelvis.
4. Retrocecal appendix, very acutely inflamed, died, 49th day, with pyelophlebitis, liver abscess and bilateral empyema, autopsy.

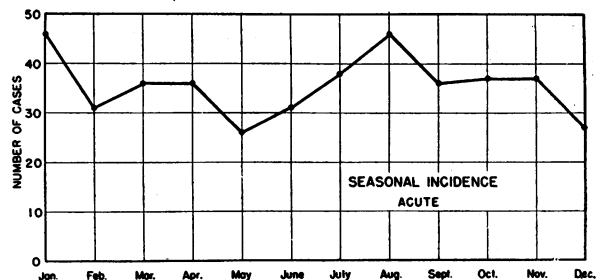


Fig. 2.—Seasonal incidence of acute appendicitis.

II.—ACUTE APPENDICITIS WITH PERFORATION, 84 PATIENTS

One may regard the phenomenon of perforation of an acutely-inflamed appendix merely as one of the expected events in the progress of the disease. However, it should be borne in mind that, in the aged, perforation, at least clinically, is frequently the first symptom. In this series of

cases the number of elderly people is insufficient for separate study as an age group; but in two of the patients of advanced years the first symptom of acute appendicitis was peritonitis commencing in the lower abdomen.

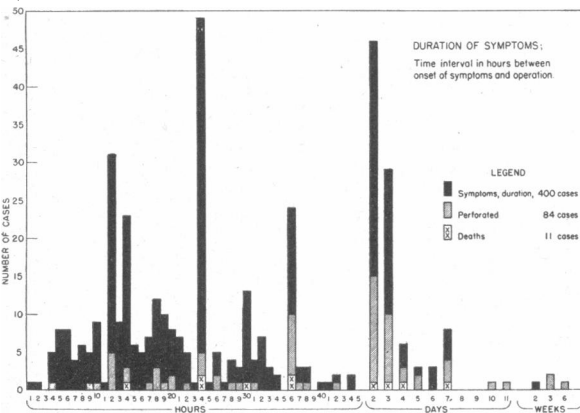


Fig. 3.—Illustrating the duration in hours of the symptoms of acute appendicitis before operation.

Duration of symptoms. An analysis of the duration of symptoms before operation indicated the shortest interval between the onset of pain and the finding of a perforated appendix at operation was four hours. This patient's symptoms at the time of operation were of such sudden onset, and so acute, that a diagnosis of ruptured gastric ulcer was made. The second shortest interval was 9 hours. The remainder of the patients had the following intervals: 10 hours—1 patient; 12 hours—6 patients; 14 hours—2 patients; 18 hours—3 patients; 20 hours—3 patients; 24 hours—4 patients. In the remainder of the patients the onset time was given too indefinitely.

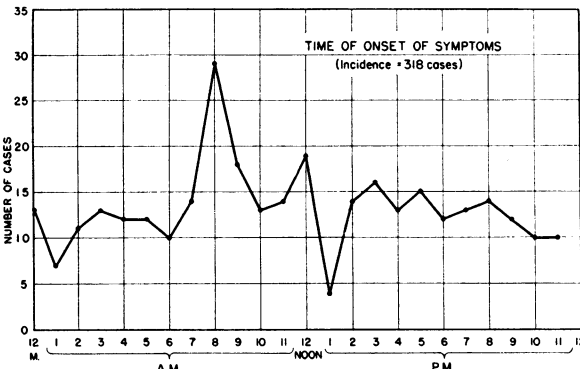


Fig. 4.—Time of onset of symptoms during 24 hours period.

In only two patients' records did the record picture the classical history of a perforated appendix: namely, right lower quadrant pain, cessation of pain, and subsequent recurrence of pain. In the majority of patients the symptoms were not distinguishable from those listed previously under the acute suppurative group. Twenty-one patients gave a history of previous milder attacks.

The diagnosis of perforation was recorded preoperatively in 26 records. In the remainder of this group the preoperative written diagnosis merely stated: "acute appendicitis." In 5 patients an additional diagnosis of "local peritonitis" was added, and in 9 patients the words "general peritonitis" were confirmed at operation.

Postoperative course of perforated group:

This survey will not attempt to analyze the postoperative treatment other than to mention the routine treatment of continuous gastric suction; daily intravenous glucose infusion of two to three liters of 10 per cent glucose in saline; hot compresses to the abdomen and no fluids by mouth. This series comprises patients treated before the time of Sulfanilamide and related compounds.

With the above treatment 45 patients made an entirely uneventful recovery. The maximum temperature postoperatively was 38.8 degrees C., reached normal (on the average) on the 9th postoperative day, and left the hospital (on the average) on the 17th postoperative day.

Thirty-nine patients showed various complications, and 10 of this number died. In explanation of the term "wound infection," in the following list of complications, it should be stated that "wound infection" is listed when either an undrained wound becomes infected, or when there is prolonged or excessive drainage with fascial sloughing of a drained wound. Several complications may be listed for the same patient.

Complications. (Patients recovered).

General peritonitis—peritoneum drained.....	8
General peritonitis—peritoneum not drained.....	1
Bronchopneumonia	5
Upper respiratory infection, not diagnosed	
Bronchopneumonia	5
Abdominal abscess opened through fascia	
peritoneum closed	3
peritoneum drained	6
Wound infection—wound not drained.....	5
Wound infection—severe	3
Pelvic abscess, drained through rectum.....	3
Fecal fistula	2
Rupture of abdominal wound.....	2
Phlebitis (on 7th day).....	1

The following complications in 10 patients terminated fatally.

1. Gangrenous perforated appendix, died, 3rd day, bilateral bronchopneumonia.
2. Acute suppurative with perforation, died, 6th day, intraabdominal hemorrhage.
3. "Adherent" ruptured appendix, died, 2nd day, peritonitis and pneumonia.
4. "Adherent" retrocecal perforated appendix, died, 6th day, "local peritonitis," toxemia, no autopsy.
5. "Gangrenous perforated appendix," died, 5th day. Colon septicemia, peritonitis, autopsy.
6. Appendix perforated with abscess, died, 2nd day. General peritonitis, blood emesis, intestinal hemorrhage, no autopsy.
7. Retrocecal perforated appendix, died, 20th day. General peritonitis. Bronchopneumonia. Carcinoma of rectum. Cellulitis of abdominal wall, no autopsy.
8. Gangrenous perforated appendix, died, 15th day. Acute peritonitis, hepatitis, jaundice. Bronchopneumonia. Autopsy.

9. Appendix necrotic and perforated, died, 5th day. Peritonitis. Wound infection.

10. Appendix perforated with peritonitis, died, 12th day. Coronary occlusion.

The death of 10 patients in 84 constitutes a mortality rate of 11.9 per cent for acute appendicitis with perforation.

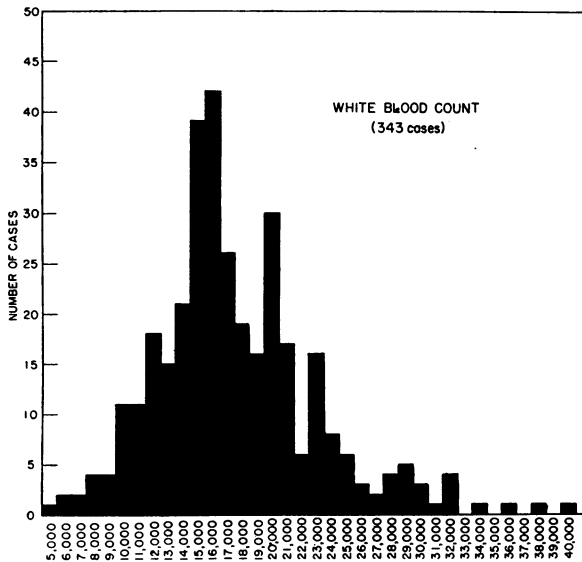


Fig. 5.—White blood count of 343 acute patients.

III.—SUBACUTE APPENDICITIS GROUP

In the foregoing two groups (acute suppurative appendicitis, and appendicitis with perforation) only patients are included in whom the diagnosis was completely proved by operative and pathological investigation. In a group of 212 patients, however, the diagnosis was not conclusively proven. In this group are included patients whose clinical history was typically that of acute appendicitis, but whose operative or pathological findings did not strictly confirm the clinical diagnosis. The records of all patients are reviewed weekly by the Hospital Record Committee, and at this time errors in diagnosis are corrected before the final diagnosis is affixed and the record cleared for filing. To this Committee there frequently come records in which a clinical diagnosis of acute appendicitis appears conclusive on the basis of history and blood counts, but in which the pathologist reported a "normal appendix." On the basis of the evidence presented in the record no other diagnosis than subacute appendix often appears reasonable. This refers particularly to some of the records to be presented below, in which typical appendiceal symptoms and findings are nullified by the pathological report that the appendix is a "fibrous cord with obliterative lumen." The authors have had the microscopic sections of these specimens reexamined to determine whether nerve plexuses, neuromas, etc., were present, but these were not demonstrated. In many of such instances, the operating surgeon has reported the appendix

"subacutely inflamed" at operation, a fact later not substantiated by the pathologist.

There is undoubtedly a large group of patients in whom the symptoms and signs of acute appendicitis were due entirely to an appendiceal colic, even though at the time of operation no fecolith or fecal matter was found in the appendix. In other instances, the surgeon has squeezed out fecal matter in manipulating the appendix. In some cases the appendix has been split open in the operating room by the surgeon, and the fecal contents scraped out with the knife handle to allow inspection of the underlying mucosa. Such specimens were observed to have been washed by the nurses before placing in the specimen jar, so that the pathologist has no knowledge of the existence of a fecolith.

In 17 records appears the notation "doctor took specimen." In some of these instances the surgeon took the specimen elsewhere for pathological examination, a procedure strictly against the rules of the hospital, although a rule difficult to enforce. In some instances the appendix was taken to the patient's room and for some reason not returned to the laboratory, the patient probably retaining the specimen to show to friends after the manner of a small boy with a recently extracted molar! Probably this group of patients should be included in the "acute suppurative group," since operative description of the removed appendix, as well as the clinical history and blood counts, indicate a high degree of inflammation. The surgeon usually has less incentive to show and give a patient a "normal" appendix that he has just removed. Tradition has it

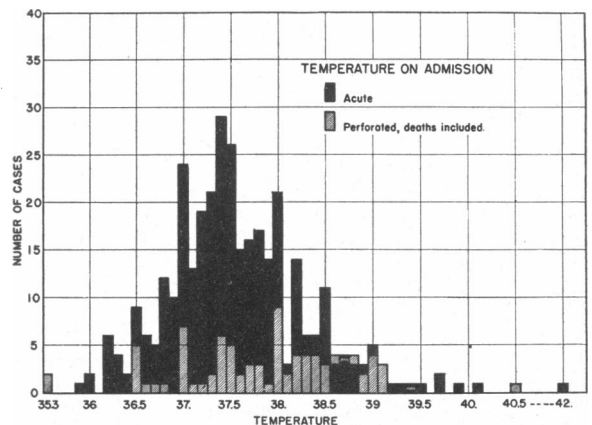


Fig. 6.—Presentation of Polymorphonuclear leukocytes in the differential blood count.

that one surgeon, removing a normal appendix, injected into the lumen a large quantity of saline, holding this with a ligature, and showing the family how nearly it had ruptured. Such practices of course belong to the dusty past!

A group of 49 records shows a pathological report of "normal appendix." This constitutes the most puzzling group for a statistician to survey.

Thirty-five records, on the basis of history and elevated blood counts and physical examination, can lead the reader of the record to no other conclusion than that the patient had acute appendicitis at the time of operation; and in 19 of these patients the operating surgeon made a preoperative diagnosis of acute appendicitis, as well as a postoperative diagnosis (including in some cases a gross description of the appendix) of acute appendicitis, whereas the laboratory returned the report of "normal appendix." In the other 14 cases, the surgeon made the preoperative diagnosis of acute appendicitis and toned this down to "subacute," still receiving a "normal" report from the laboratory. In 4 records the surgeon made no comment on the gross appearance of the appendix, although a preoperative diagnosis of acute appendicitis appeared justified.

In a group of 10 patients the clinical history certainly appeared to be typical of acute appendicitis, and to a certain extent the clinical examination also. However, the blood count (total as well as differential) appeared well within normal limits. The diagnosis of normal appendix from the laboratory is not such a surprise to the reviewer. What the actual diagnosis is on such a patient is open to debate.

An interesting group of patients is presented in the group of 34 who had *fecal obstruction, fecoliths, or packed fecal matter* in the appendices. In all but 3 instances the clinical history and abdominal examination led to the diagnosis of acute appendicitis. The 3 exceptions were classed as subacute. In none of the specimens removed was acute inflammation encountered, although the white blood count was elevated in more than half of the patients, as indicated:

below 10,000	7 patients
10,000-12,500	10 patients
12,500-15,000	8 patients
15,000-17,500	4 patients
17,500-20,000	3 patients
20,000-25,000	2 patients

A parallel increase in polymorphonuclear differential count is also encountered. It has been shown, elsewhere, that fecal impaction without local inflammatory change is often associated with a leucocytosis.

Comment.—A group of 39 patients is classed pathologically as *subacute*. In these the pathological process in the appendix was not sufficiently aggravated to permit the pathological diagnosis of acute suppuration. On checking the records and the pathological specimens in detail, the reviewer feels justified in making a special group of this series. An analysis of the clinical findings, history and blood counts reveals no additional features of interest. In this group the postoperative course was uneventful, except for two wound infections and 4 patients with mild upper respiratory symptoms. There were no deaths.

Lymphoid hyperplasia.—In 16 patients the pathological report indicated "lymphoid hyperplasia." In these specimens large masses of lymph-

oid tissue are seen in the submucosal layers without polymorphonuclear infiltration. The symptoms of these 16 patients would in each case justify a diagnosis of acute appendicitis. Blood counts varied from 5,500 to 24,000. In each case the surgeon made a preoperative diagnosis of acute appendicitis. In one patient the symptoms were sufficiently acute to lead the surgeon to a preoperative diagnosis of perforated gastric ulcer. This patient had sudden acute abdominal pains, "doubling him up." He had had a few milder attacks previously; he had vomited; he had board-like rigidity of both lower recti, and less rigidity of the upper recti muscles. His thighs were flexed and the skin was cold and clammy. White blood cells count 12,850 with 82 per cent polymorphonuclear cells. The upper abdomen was negative on exploration: the surgeon removed an appendix which he described "an acutely inflamed," but the pathological report showed only enlarged lymph follicles. No other pathology was encountered, and except for a slight wound infection on the eighth day, the patient made an uneventful recovery. The majority of this group of "lymphoid hyperplasia" had a much milder onset, although in 12 other patients the preoperative diagnosis was made of acute appendicitis, and on the face of the record this appeared justified.

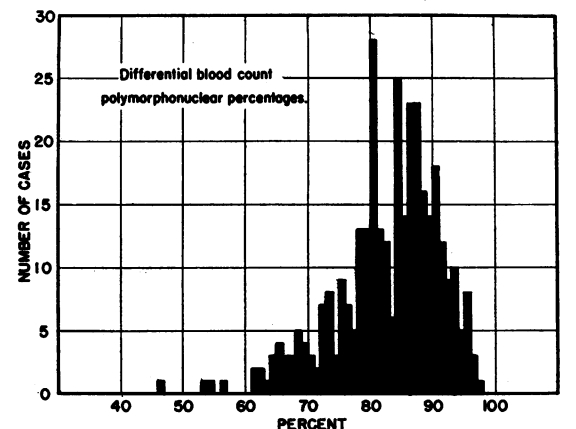


Fig. 7.—Illustrating the temperature of the patient on admission to the hospital.

A group of 55 patients was next encountered in which the pathological findings emphasized "fibrosis" either in the submucosa, muscularis or subserosa layers — without acute inflammatory changes. In 17 patients the preoperative diagnosis was subacute appendicitis. In the other 35, however, a diagnosis of acute appendicitis was made before operation, and appeared justified from studying the records. The white blood counts varied from 4,800 to 24,000, as indicated in the following table:

Less than 10,000	4 patients
10,100-12,500	6 patients
12,500-15,000	10 patients
15,000-17,500	7 patients
17,500-20,000	3 patients
20,000-24,000	3 patients
no record	1 patient
Total 35	

In one patient a typical large *mucocoele* of the appendix was encountered. This patient had five hours of general abdominal pain, later localizing in the right lower quadrant with vomiting, and local tenderness, but without guarding. White blood count was 13,000, with 77 per cent polys. A preoperative diagnosis of acute appendicitis was made. In 3 patients the appendix was a fibrous cord.

One patient with "*carcinoid*" appendix was encountered. This young man, age 21 years, had abdominal cramps for 36 hours, with vomiting and tenderness and rigidity in the right lower quadrant. White blood count showed 22,700 cells, with 88 per cent polymorphonuclear cells. A preoperative diagnosis of "gangrenous appendix" was made by the surgeon. Acute inflammatory changes in the appendix were found, as well as typical carcinoid cells: the latter predominating.

Summary.—Summarizing the preceding group of "subacute appendicitis," we have included:

Diagnosis (pathological) "normal".....	49 patients
No diagnosis (Doctor took specimen)....	17 patients
Subacute:	
Fecolith, obstructive, no inflammation..	34 patients
Fibrosis (thickening of muscularis serosa and acute inflammation).....	55 patients
Lymphoid hyperplasia	1 patient
Mucocoele	1 patient
Carcinoid (and acute).....	1 patient
TOTAL,	212 patients

In this group there were no deaths.

IV.—ABSCESS WITHOUT PERFORATION

Five patients were subjected to operation, in whom an abscess was encountered which was drained without the removal of the appendix. It seemed advisable to group these separately. In three of these patients the appendix was not seen at the time of operation: the abscess being drained without exploration. In one patient the appendix was reported as ruptured, but was not disturbed. In the fifth patient the appendix also was reported as ruptured and was not removed. The abscess was drained; but after 17 days a pelvic abscess was diagnosed, the old incision opened and the appendix removed, while the pelvic abscess was drained. This patient died of perisplenic and subhepatic abscesses, as well as a purulent peritonitis.

SUMMARY

Summarizing the foregoing groups we have the following mortality statistics:

A. Acute suppurative appendicitis	343 cases	4 deaths	1.16%
B. Acute perforated appendicitis	84 cases	10 deaths	11.9%
C. Subacute appendicitis....	212 cases	0 deaths	0%
D. Abscess drained (0 appendectomy)	5 cases	1 death	20%
TOTAL	644 cases	15 deaths	2.32%

V.—CHRONIC APPENDICITIS

There remains for consideration a group of

353 patients, with a diagnosis of "chronic appendicitis." In this group are listed persons who might have had several attacks of right lower quadrant abdominal pain, but in whom acute symptoms were no longer present, or who had previous typical acute appendicitis, but for various reasons postponed operations. There were also a few patients who were contemplating employment in remote regions and, fearing an acute attack of appendicitis, had their appendices removed as a prophylactic measure.

To be of value in a survey such as the present, this group especially should have a follow-up record; but this is impossible, owing to the number of different surgeons operating. It is noted, however, that four patients in this group died.

The mortality for the entire series, therefore, is listed in groups:

A. Acute suppurative.....	343	4 deaths
B. Perforated	84	10 deaths
C. Subacute	215	0 deaths
D. Abscess drained	5	1 death
E. Chronic	353	4 deaths
TOTAL	1000	19 or 1.99%

CONCLUSIONS

One cannot read the records and abstract on a separate card (as is necessary on every survey), almost one thousand case-histories, without reaching certain conclusions and impressions. Frequently the conclusion is based on definite figures, and such have been presented in the preceding. Often, however, an impression is formed on certain points, but the factual data are insufficient to make a deduction capable of expression with mathematical exactitude. Although no new or startling deduction or impression was arrived at during the foregoing survey, the truth of the familiar aphorism of early diagnosis and early operation is evident. Also the increasing tendency of the public at large to avoid the taking of cathartics for abdominal cramps was repeatedly noted: at least some phases of medical education are bearing fruit.

It was noted also by the reviewers that, when the mortality of the staff of the hospital as related to the various subgroups is compared with that of the visiting surgeons permitted to use the facilities of the hospital, the difference is not more than a few tenths of 1 per cent, and that in favor of the hospital staff. This is true equally of the postoperative morbidity, which, although carefully checked on the summary cards, was not expressed graphically or explicitly in the foregoing study. This indicated that the hospital exercised vigilance and care in permitting visiting surgeons to use surgical facilities. Whenever the Interns and Resident Staff note that a visiting surgeon is in difficulties, word is quietly passed along to the Surgical Executive, who may volunteer assistance at the operating table, or volunteer advice on the wards. The hospital thus discharges its obligations to safeguard its patients: that it does so satisfactorily has been shown in this study.

St. Luke's Hospital.